

**Claims**

What is claimed is:

1. A railroad frog apparatus for connecting intersecting rail lines comprising:  
  
a body having flangeways that intersect; and  
  
at least one connection plug extending from the body for connecting to a running rail;  
  
the at least one connection plug having a cross-sectional profile that is substantially identical to a cross-sectional profile of the running rail.
2. The railroad frog apparatus of claim 1 comprising first, second, third, and fourth connection plugs extending from the body, each connection plug having a cross sectional profile that is substantially identical to a cross sectional profile of the running rail to which that connection plug will connect.
3. The railroad frog apparatus of claim 2 wherein the first and third connection plugs have cross sectional profiles for connecting a first type of running rail and wherein the second and fourth connection plugs have cross sectional profiles for connecting a second type of running rail.
4. The railroad frog apparatus of claim 1 wherein the at least one connection plug extends from the body a distance that allows the running rail to be connect by a thermite weld.
5. The railroad frog apparatus of claim 1 wherein the apparatus is constructed of rail steel.

6. The railroad frog apparatus of claim 1 wherein the apparatus is formed from a single piece of material.
7. The railroad frog apparatus of claim 6 wherein the apparatus is formed by machining.
8. The railroad frog apparatus of claim 1 wherein at least one of the flangeways has a floor having a convex portion defined by an arc extending between first and second points, the first and second points being at flangeway depths so as to avoid contact with a flange of train wheel passing through the flangeway.
9. The railroad frog apparatus of claim 8 wherein the arc is of approximately constant radius.
10. The railroad frog apparatus of claim 1 wherein at least one of the flangeways has a floor having a convex portion defined by a first arc, a second arc and a third arc; the first arc extending from a first point to a second point; the second arc extending from the second point to a third point; the third arc extending from the third point to a fourth point; the first and fourth points being at flangeway depths so as to avoid contact with a flange of a train wheel passing through the flangeway; wherein upon the train wheel entering the flangeway, the flange of the train wheel initially contacts the floor at a point on the first arc; and wherein upon the train wheel exiting the flangeway, the flange of the train wheel disengages the floor at a point on the third arc.
11. The railroad frog apparatus of claim 10 wherein the first arc, the second arc, and third arc are all of approximately constant radius.
12. A railroad frog apparatus for connecting intersecting rail lines comprising:

a body having two flangeways that intersect;

at least one connection plug extending from the body for connecting to a running rail, the  
at least one connection plug having a cross-sectional profile that is substantially identical to a  
cross-sectional profile of the running rail;

the at least one connection plug extending from the body a distance that allows the  
running rail to connect to at least one connection plug by a thermite weld;

wherein the apparatus is machined from a single piece of rail steel; and

wherein at least one of the flangeways has a floor having a convex portion defined by a  
first arc of constant radius, a second arc of constant radius and a third arc of constant radius; the  
first arc extending from a first point to a second point; the second arc extending from the second  
point to a third point; the third arc extending from the third point to a fourth point; the first and  
fourth points being at flangeway depths so as to avoid contact with a flange of a train wheel  
passing through the flangeway; wherein upon the train wheel entering the flangeway, the flange  
of the train wheel initially contacts the floor at a point on the first arc; and wherein upon the train  
wheel exiting the flangeway, the flange of the train wheel disengages the floor at a point on the  
third arc.

13. A railroad frog apparatus for connecting intersecting rail lines comprising:

a body having flangeways that intersect; and

a plurality of connection plugs extending from the body for connecting to a running rail;  
and

wherein at least one of the flangeways has a floor having a convex portion defined by an arc extending between first and second points, the first and second points being at flangeway depths that avoid contact with a flange of a train wheel passing through the flangeway.

14. A railroad frog apparatus for connecting intersecting rail lines comprising:

a body having flangeways that intersect; and

a plurality of connection plugs extending from the body for connecting to a running rail;

wherein at least one of the flangeways has a floor having a convex portion defined by a first arc, a second arc and a third arc; the first arc extending from a first point to a second point; the second arc extending from the second point to a third point; the third arc extending from the third point to a fourth point; the first and fourth points being at flangeway depths so as to avoid contact with a flange of train wheel passing through the flangeway; wherein upon the train wheel entering the flangeway, the flange of the train wheel initially contacts the floor at a point on the first arc; and wherein upon the train wheel exiting the flangeway, the flange of the train wheel disengages the floor at a point on the third arc.

15. A method of connecting two running rails for intersection in a railroad comprising:

providing a railroad frog apparatus having a body with two intersecting flangeways and four connection plugs extending from the body, each of the connection plugs having cross-

sectional profiles that are substantially identical to a cross-sectional profile of a corresponding running rail to which the connection plug is to be connected;

butting the running rails against the corresponding connection plug; and

welding each running rail to the connection plug it is butted against.

16. The method of claim 15 wherein the welding step is a thermite weld.

17. The method of claim 15 wherein the railroad frog apparatus is machined from a single piece of rail steel.

18. The method of claim 15 wherein at least one of the flangeways of the railroad frog apparatus has a floor having a convex portion defined by a first arc of constant radius, a second arc of constant radius and a third arc of constant radius; the first arc extending from a first point to a second point; the second arc extending from the second point to a third point; the third arc extending from the third point to a fourth point; the first and fourth points being at flangeway depths so as to avoid contact with a flange of train wheel passing through the flangeway; wherein upon the train wheel entering the flangeway, the flange of the train wheel initially contacts the floor at a point on the first arc; and wherein upon the train wheel exiting the flangeway, the flange of the train wheel disengages the floor at a point on the third arc.